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The Commercial Revolution in Space Systems Acquisition Management

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ABSTRACT

Acquisition reform in the Department of Defense has become one of the highest priority initiatives currently underway. This report examines the applicability of commercial acquisition practices to the development of DoD space systems. In conducting this analysis, the results of a quantitative study conducted for the Office of the Deputy Undersecretary of Defense for Acquisition Reform known as the Coopers & Lybrand/TASC Study are compared with a qualitative study conducted by the Office of the Assistant Secretary of the Air Force (Space) known as the Industry Advisory Council Study. In light of the conclusions of these two studies, several current space systems acquisitions are reviewed to take a look at the potential for successful implementation of commercial practices in the acquisition of DoD space systems. The results to date are very encouraging.

I. INTRODUCTION

Among the most perplexing challenges to evolve from the realignment of the bipolar world order in the early nineties have been the orthogonal requirements to modernize our aging military technology, maintain a healthy and robust military industrial base, and drastically reduce the amount of national budget we invest in this endeavor. This dilemma was captured in the opening pages of Secretary of Defense Perry's February, 1994 report entitled Acquisition Reform: A Mandate for Change. He addressed two fundamental objectives in his report.

The first objective was to maintain technological superiority and a strong national industrial base. He proposed that this should be done by :

- rapidly purchasing commercial and other state of the art products and technology from reliable suppliers who utilize the latest manufacturing and management techniques;
- assisting in the conversion of defense-unique companies to dual-use production;
- aiding in the transfer of military technology to the commercial sector; and
- preserving defense-unique core capabilities.

The second objective was to reduce acquisition costs (including DoD's oversight costs) through the adoption of commercial business practices and relief from the requirement to impose Government-unique terms and conditions on its contractors to the maximum extent practicable.[1]

These two objectives do not complement each other particularly well. On one hand, we are trying to strengthen the defense industry and on the other hand we are investing fewer dollars in it. The focus of this paper will be on the second objective, reducing defense acquisition costs, but we must keep in mind

[1] Perry, William J., Acquisition Reform : A Mandate for Change, OSD, February 9, 1994, pp. 2-3.

throughout the discussion that the first objective remains a high priority.

The concept of applying commercial business practices to DoD acquisitions has been broadly analyzed and applied to a wide spectrum of system developments across the Department of Defense, however, a particularly challenging area for application of these principles is in the acquisition of space and launch systems. Because of the extremely high costs of these systems and their growing criticality to the success of military operations, they have historically been developed with a 'risk-averse' mindset which has precluded even the smallest measure of streamlining in the key cost-driving areas such as test planning and execution, quality inspection of parts and workmanship, and engineering documentation.

My thesis in this research project is that the use of selected commercial practices can save the government substantial financial resources and development time, while continuing to deliver quality space and launch systems for the Department of Defense. The first part of the report will examine commercial practices and their potential benefits from two different perspectives. The first is a quantitative analysis performed for the Office of the Deputy Under-secretary of Defense for Acquisition Reform and the second is a qualitative survey of senior management in the space industry. With this foundation, I will then briefly review the current status of commercial practices implementation at a summary level, followed by a series of short analyses of current space programs.

II. COMMERCIAL PRACTICES . . . A QUANTITATIVE PERSPECTIVE

There have been at least six major studies in recent years which have assessed the impact of Government regulations and oversight on defense acquisitions. These included reports by the National Performance Review; the Defense Science Board (DSB); the Carnegie Commission on Science, Technology, and Government; the American Defense Preparedness Association (ADPA); and

the Center for Strategic and International Studies (CSIS). Upon reviewing this spectrum of previous studies, the Office of the Deputy Undersecretary of Defense for Acquisition Reform enlisted the team of Coopers and Lybrand (C&L) and The Analytical Sciences Corporation (TASC) to conduct a more rigorous, empirical analysis of the specific cost premiums DoD pays for customary government oversight of defense acquisitions.

The C&L/TASC study team conducted detailed surveys at ten defense contractors with a diverse range of size, region, industry sector, tier position, participation in the commercial market, and other factors. The study methodology focused on the 'value added' costs associated with each contractor's activities. That is, material purchases at each respective tier level in the contractor-subcontractor chain were not included in the cost equation. This focuses the analysis on the actual efforts (and compliance requirements) performed by each contractor and subcontractor in the 'food chain'. The contractors surveyed included Allison Transmission, Beech Aircraft, Boeing Defense and Space Group, Rockwell Collins, Hughes Space and Communications, Motorola, Oshkosh Truck Chassis, Tinker (bearings), Teledyne Ryan (turbine engines), and Texas Instruments.[2]

While the study was careful to apply caveats stating that the sample was small, it concluded that the average DoD regulatory cost premium was 18% of the value-added cost of the government contracts (and their associated subcontracts)[3]. This means that for every dollar we spend on a defense contract, about 18 cents is used to satisfy government regulatory provisions and standards. For multi-million dollar programs, this premium adds up to very substantial figures. This 18% figure was consistent with the general ranges of cost premiums cited in the previous studies, however, the methodology by which it was derived was much

[2] C&L/TASC, The DoD Regulatory Cost Premium: A Quantitative Assessment, December 1994, pp. 4-9.
[3] Ibid., p.12.

more rigorous and credible. It should also be noted that the cost premiums cited relate only to contractor costs. When the government costs associated with oversight of these provisions are included, the premiums are significantly higher.

The C&L/TASC Report was subsequently used as the starting point for a major OSD study effort conducted by the "DoD Regulatory Cost Premium" Working Group and coordinated by the Acquisition Reform Senior Steering Group. This study group launched a comprehensive review of all primary cost drivers and identified a detailed action plan to assess what was being done or what could be done to reduce these cost and schedule-consuming activities.[4] The group started with the report's summary conclusion that 130 regulatory and standards-based cost drivers contribute to the 18% premium that the DoD pays on its contracted deliverables. Of these 130 cost drivers, the top 24 account for 75% of the cost premium, and these 24 requirements were the focus of the OSD working group activity. The C&L/TASC Report actually summarized the results in terms of the top 10 cost drivers accounting for 50% of the premium. Either way, there are obviously a few practices which have high cost reduction potential if they could be changed. The top ten cost drivers and their associated cost premiums were:

1. DoD Quality Program Requirements (MIL-Q-9858A) 1.7%
2. Truth in Negotiations Act (detailed cost or pricing data) 1.3%
3. Cost/Schedule Control System (C/SCS) reporting reqmts .9%
4. Configuration Management Requirements .8%
5. Contract Specific Requirements .7%
6. Defense Contract Audit Agency (DCAA)/Defense Contract Management Agency (DCMAO) Interaction .7%
7. Cost Accounting Standards .7%

[4] Acquisition Reform Senior Steering Group, Compendium of OPR Reports, OUSD (A&T), June 30, 1995, pp. ES1-ES3.

8. Material Management Accounting System (MMAS)		.6%
9. Engineering Drawing requirements		.6%
10. Government Property Administration		.5%
	Total	8.5%

These ten factors accounted for nearly half of the 18% price premium paid by DoD.[5] It is important to note that the contractors generally believed strongly in the importance of the functions being addressed by these requirements. It was inefficiencies associated with the government's methods of carrying them out that resulted in excessive costs.

Although several of these cost premiums have impacts during the production phase of space systems developments, clearly the biggest potential for savings occurs during the early phases of acquisition while the engineering baseline is being established. This is even more relevant to space programs, where 'production lots' are typically numbered in single digits. Also, since it has been shown historically that the vast proportion of a program's life cycle costs are cemented during the early stages of design and development, efficiencies which are 'engineered in' up front will have significant life-cycle payoffs.

Of the ten defense contractors surveyed for the C&L/TASC Study, only two or three are involved in developing space systems and it is not clear from the report just how much the space development activity influenced the results from these companies. Therefore, one could reasonably ask if the results would be valid for space hardware as well. In a couple of different slices of the data from C&L/TASC, however, they report that electronics and communications activities have a 25% cost premium (rather than the cumulative 18% figure) owing to government test and inspection requirements as compared to 11% for land/mechanical systems. The high proportion of electronic subsystems and components associated with space systems makes this figure particularly

[5] C&L/TASC, The DoD Regulatory Cost Premium, December 1994, p. 18.

relevant for this study. Similarly, companies which produce "military-unique" systems for DoD have a 22% premium as compared to 13% for those companies which produce items for DoD which are substantially based on commercial designs. Up to this point in history, space systems have most certainly been in the first category, although, as you will see later in this report, we are on the threshold of a change in this paradigm. Finally, companies which produce systems with "high engineering content" reported a 27% premium cost as compared to 14% premium for "low engineering content" systems. One can safely assume that space systems fall in the "high engineering" category.[6]

III. COMMERCIAL PRACTICES. . .A QUALITATIVE PERSPECTIVE

At about the same time as the Coopers & Lybrand/TASC team was conducting their surveys in 1994, the Office of the Assistant Secretary of the Air Force (Space), conducted a semi-formal survey of senior leadership in five leading aerospace companies to get their inputs on ways to improve the management of DoD space programs. These companies included Boeing, Hughes, Lockheed and Martin Marietta (now Lockheed-Martin), Motorola, and TRW[7]. The final report from this so-called Industry Advisory Council (IAC) was provided to the Defense Science Board in October 1994. Although the effort did not specifically focus on commercial practices, subsequent analysis was conducted in which these practices were fleshed out. This study did not share the same degree of empirical rigor as the C&L/TASC effort; however, it is of interest since this particular sampling capitalized on the experience and stature of the participants to the field of space systems acquisition.[8]

The Industry Advisory Council identified nine areas of particular

[6] Ibid., pp. 14-16.
[7] NOTE: Boeing, Hughes, and Motorola participated in both analyses discussed in this report.
[8] The Industry Advisory Council included Steve Dorfman and Don Cromer of Hughes, Sam Araki and Ken Peters of Lockheed, James McAnally of Martin Marietta, Tim Hanneman and Bob Kohler of TRW, and Jerry King and Allen Ashby of Boeing, among others.

importance in their commercial practices.[9] These are methodologies the space industry generally uses when dealing with other contractors, however, in the opinion of the IAC, they could be used to great advantage in government-to-contractor acquisition relationships as well. They include:

A. "Best Value" Contracting

This was the IAC's shorthand method of stating that they believe in the basic principles of Total Quality Management. Businesses stay in business by providing a quality product satisfying market needs at market prices. The Integrated Product and Process Development approach to major system development ensures the full system perspective is maintained during development as well as production, and it ensures that the finished product meets or exceeds the customer's expectations. If the resultant price of such efforts is not the lowest in every case, the long run value of the quality product makes this approach preferable from a business perspective. The IAC also recognizes that customer participation enhances customer satisfaction.

B. Team Development

The development of a major system typically requires a team of experts normally not found in a single company. Primes usually pursue limited competition or sole source selection when setting up their teams. Industry capabilities are fairly well known so the buyer will approach the seller (often preferred suppliers) based on that supplier's proven performance on prior projects. If the selection process is competitive, it is quick and informal. There are no protests. In the case of preferred suppliers, long-term agreements are possible resulting in lower prices. Because their capabilities are known and there is a history of a good working relationship, start-up time is reduced and future product support is ensured. The key in any team is open effective communications throughout the life cycle.

[9] Sundberg, Eric, Commercial Practices Study, July 19, 1995.

C. Price, Not Cost, Basis

Outside the company which is performing the work, cost is not a significant consideration. What matters to the customer is the bottom line price. Consequently, costs, cost structure, and profit are treated as proprietary data. It is the supplier's responsibility to determine what constitutes a reasonable profit within the market-constrained price. This ability to deal at the bottom line makes it possible to contract on a fixed-price basis.

D. Fixed Price Contracting

This type of contract is obviously desirable for a prime because they get a product at a guaranteed price. They can incentivize or penalize their suppliers based on key parameters (i.e., cost, schedule, and performance). Obviously, the supplier will only agree to such an arrangement when his risks are identified, minimal, and manageable, and/or the potential rewards sufficiently outweigh the risks. Characteristics of 'minimum risk' would ideally include:

- conducting production on proven technology (i.e., not betting on a technological breakthrough to meet the requirements)
- stable evolutionary development (i.e., no major requirements changes are allowed until block upgrades)
- stable funding[10]
- high level performance requirements

E. High Level Performance Requirements

The basic philosophy here is to tell the supplier *what* is needed, not *how* to do it. This allows the supplier to make design tradeoffs without customer meddling. The customer only gets involved if the requirements cannot be met.

[10] Although funding stability is identified only as a contributing factor to risk in this report, the issue of multi-year funding has traditionally been singled out as one of the most onerous handicaps in defense systems acquisition. The inability to make firm long-term commitments between primes and suppliers has a very significant impact on overall program costs.

F. Contractor Processes, Procedures, Formats

Contractors have learned that they cannot stay in business in the current competitive environment without delivering a quality product. They have found, however, that it is more cost effective to design quality in from the outset rather than 'inspect it in' later in the development cycle. The histories of DoD space programs are replete with examples of major schedule delays and cost overruns resulting from problems or failures (or *perceived* problems) discovered during the final stages of testing and inspections. Consequently, a program which might have appeared to be tracking cost and schedule goals early in its development merely delayed the inevitable by making mistakes or inappropriate engineering trades early on. 'Designing in' quality early in the program gives the contractor the flexibility to meet customer requirements in the most cost-effective manner. They are able to use the latest improvements in processes and procedures to the extent that it is possible without violating requirements. And, since they are held accountable only for producing a product which meets the performance requirement at the agreed price, they can respond quickly to market changes.

G. Minimum Documentation and Data

In the commercial world, the amount and content of data is limited to only the most essential to do the job. Buyer as well as supplier documentation is bare bones. Typical contract data includes: specifications, scope of work, price and payment terms, and basic terms and conditions (e.g., incentive structure). Typical deliverables might include: test plan and procedures, program management plan, product assurance plan, and operations-related materials. As you might expect, intellectual property rights are carefully protected in the commercial world. All non-proprietary, non-deliverable information may be accessible to the buyer, but it is held at the supplier's plant and is for customer

information only.

H. Minimum Oversight

Interfaces between customer and supplier are strictly defined with single or very limited points of contact between team members. Daily contact between these single interfaces is usually maintained to stay abreast of progress and problems. Contractors maintain a very short chain of command with program authority and responsibility. Decisions are pushed to the lowest level and the decision process is quick.

I. Voluntary Social Engineering

Individual companies determine their own level of 'social engineering'. More and more, companies are learning that it's good for public relations and, therefore, good for business to ensure that their personnel and business practices are socially responsible. However, they must also ensure that the company stays in business and makes a profit, so they reserve the flexibility to make tradeoffs in these areas, as long as the laws of the land are observed.

The question one must ask at this point is "Do these industry practices make sense in the context of government contracts with industry?" The skeptic would claim that it is not at all surprising to see items on this list which would reduce the insight and intrusion by the government into the contractors' business. After all, the skeptic might argue, if the contractors can eliminate government scrutiny they can take all manner of shortcuts and defraud the government without getting caught. Unfortunately, there are numerous examples from the past of such abuse.

My assessment, however, is that times have changed and there is considerable merit in pursuing most, if not all, of these practices for government contracts. Evidence that senior DoD leadership shares these impressions is borne

out by many of the new policies implemented by OSD and the services. The reasons these approaches make sense now include the following: First, industry experience has shown that the processes work. They are currently being used successfully by contractors in business with other contractors. Second, companies have learned the value of quality workmanship. In today's market they simply cannot afford to do sloppy work. The environment is so competitive and (industry consolidation notwithstanding) there are enough "hungry" and capable alternative sources available, that the company must deliver. Third, while the costly government obsession with regulation and oversight has resulted in good products in the past, recent experience in business and government has shown that a greater spirit of teamwork between government and contractor will ensure adequate visibility as well as improve the quality of the final product.

An analysis of the details of each of these studies shows a strong correlation between their findings. The C&L/TASC study tells us that the DoD is probably spending at least 18-25% more for its space systems than it would if it were purchasing them under normal commercial practices. The IAC study, representing the views of some of the most senior, experienced leaders in the space industry, says that if you want to improve and streamline space systems acquisition, you should adopt approaches similar to those commercial practices cited.

To illustrate the correlation, the table below shows a mapping of IAC-recommended practices to C&L/TASC cost drivers and the associated DoD cost premium percentage of value-added costs. As a point of reference, these cost premium percentages are then applied to the $1.5 billion estimated program cost of the Evolved Expendable Launch Vehicle (EELV) Engineering and Manufacturing Development (EMD) contract.[11]

[11] EELV EMD Cost Estimate from AQSL EELV Program Review.

IAC Recommend-ations	C&L/TASC Cost Drivers	Associated Cost Premiums	Cumulative Cost Premium Percentage	Potential EELV Cost Savings
Price Not Cost Fixed Price	TINA, C/SCS, CAS	1.3% +.9%+ .7%	2.9%	$43.5M
Hi Level Perf Rqmts	Contract Specific Rqmts	0.7%	0.7%	$10.5M
Kr Processes, procs, format Minimum Doc and Data	QA, CM Rqts, Eng Drawings	1.7% + .8% +.6%	3.1%	$46.5M
Minimum Oversight	DCAA/DCMAO MMAS, Govt Property Administration	.7% +.6% + .5%	1.8%	$27M
TOTAL			8.5%	$127.5M

While the accounting may be inexact, it provides a rough feel for the magnitude of the costs we are addressing. Note that the figures in the table above represent only the top ten cost drivers. If we consider the entire 18% cost premium calculated by C&L/TASC, there is an additional potential $142.5 million savings, for a total of $270 million for EELV EMD. The reader is cautioned that these EELV figures do not represent a program office-endorsed conclusion. They are included merely to show the potential magnitude of savings which could be realized if the C&L/TASC model is correct.

One might note in passing that although Voluntary Social Engineering was cited as one of the top nine influencing factors in the IAC Study, the C&L/TASC Study only identified a 0.1% cost premium associated with "Socioeconomic Programs."

Having established that there is 'real money' at stake in this discussion, let us turn to an examination of just what DoD is doing to address these issues.

IV. CURRENT STATUS OF DoD ACQUISITION REFORM

There are actually two related agendas for acquisition reform. The first agenda is sponsored by Congress and has resulted in legislation passed in both 1994 and 1996. In 1994, Congress passed the Federal Acquisition Streamlining Act (FASA) which calls for preference to be given to the use of certain commercial practices in defense programs. FASA provides incentives for the use of electronic means of reducing the massive paperwork associated with federal procurements. It encourages computer-to-computer transfers of many contractual deliverables both to and from contractors. FASA also relieves some of the annoying cost reporting requirements associated with the Truth in Negotiations Act (TINA). Specifically, it raises the threshold for reporting detailed cost and pricing data from $100,000 to $500,000 and it eliminates all detailed reporting for "commercial

items." [12] Obviously, since space systems nearly always cost in excess of $500K there is still room for additional relief. This is, however, the first movement towards less rigorous cost reporting requirements, and further revisions are expected. It is also worth noting that certain subcontracted subsystems may be able to take advantage of this increased ceiling, thus relieving some pressure on small business suppliers to larger space system prime contractors.

The second agenda is championed by DoD and it has had a much more dramatic and timely impact because it is not specifically constrained by statutory regulation. OSD senior leadership as well as senior acquisition leaders in the military departments are vigorously mounting the charge on acquisition improvement. The thrust for change is coming right from the top of DoD management in the persons of Secretary of Defense William Perry and Undersecretary of Defense for Acquisition and Technology (USD (A&T)) Paul Kaminski, and they have spared no time in making the changes required to streamline the process.

As early as June 94, Secretary of Defense Perry issued a memorandum directing the use of performance specifications (i.e., 'what we need, not how to do it') to the maximum extent practicable, and the development of a streamlined process to encourage contractors to propose non-government specifications and industry-wide practices that meet the intent of existing government standards and specifications. In the first six months after the publication of the C&L/TASC Report, the SecDef inactivated MIL-Q-9858A, which was the military standard for the DoD Quality Program. Pilot programs and reinvention labs are studying how to optimally streamline the process, but in the meantime, the number one cost driver (namely, Quality Assurance standards) has a stake through its heart, and contractors are relying on best commercial practices to ensure quality.

Sixteen other military standards have also been cancelled or migrated into

[12] Lumer, Mark J., "The Federal Acquisition Streamlining Act", TIPS, Vol. 5, No. 10, October 1994, pp. 1-5.

simpler standards. Ten specific regulatory reforms associated with the FAR, DFARs, and cost accounting standards have been implemented. Eight specific reforms to reduce government oversight of contractors have been implemented. On 10 May 1995, Dr. Kaminski signed out a memo directing OSD and the services to use Integrated Product Teams (IPTs) and Integrated Process and Product Development (IPPD) techniques for as many acquisition functions as possible.[13] For the first time, senior DoD management forced their staff to work as team members with the services, rather than as ambushers.

In the Air Force, which has executive agency for most major DoD space programs, the acting Assistant Secretary of the Air Force for Acquisition has instituted a series of "Lightning Bolt Initiatives" to improve and streamline the acquisition process.[14] These initiatives include a new 'lean and mean' program office manpower model to greatly reduce government management overhead; cancellation of all Air Force Materiel Command product center-level acquisition policies; a greatly increased weighting of past performance records in the selection of contractors for new system developments; and replacement of a large complement of traditional government acquisition documentation by a Single Acquisition Management Plan.

At the level of program office to contractor interface, many new program management practices, including wholesale adoption of the Integrated Product Team concept have been extremely successful.

All of these initiatives have had an immediate payoff and they exemplify what can be done without Congressional interference if senior leadership simply decides that there is a better way to do business and the time for change is <u>now</u>. Let's take a look at some examples of this new mindset in action in the space sector.

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[13] Memo for the Service Secretaries, et.al., "Use of IPPD and IPTs in DoD Acquisition", signed by USD (A&T), 10 May 1995.

[14] <u>AF Acquisition Lightning Bolt Initiatives</u>, OASAF (Acquisition), Update #4, August 21, 1995, pp. 1-5.

V. THE EVOLVED EXPENDABLE LAUNCH VEHICLE (EELV)

The overarching objective of the EELV Program is to reduce the cost of launch to the nation. The program goal is to reduce the life cycle costs of launch systems by 25 to 50%. The EELV is intended to service the entire medium and heavy national launch mission model currently provided by the Delta, Atlas, and Titan IV launch vehicles. Although commercial launches are excluded from the baseline program justification, it is assumed that the EELV contractor will market the system commercially. This addresses Dr. Perry's first objective cited above to promote dual-use technology and to promote the transfer of military technology to the commercial sector. The EELV Program is a showcase of streamlined acquisition initiatives, including the following: [15]

A. Eighteen program office reports, plans, and analyses which historically have comprised more than one thousand total pages have been consolidated into one Single Acquisition and Management Plan (SAMP) consisting of less than fifty pages.

B. Milestone reviews will take the form of Defense Acquisition Executive (DAE) Reviews instead of Defense Acquisition Boards. Although this sounds semantic in nature, it really reflects the new IPT approach to milestone reviews and will take place as a working "paper/electronic review" rather than the much more formal and painful structured process in past days. This is expected to result in significant reductions in the time required for milestone approvals.

C. Electronic media will be used for the Request for Proposal, all source selection activities, and the contract and data library. This will serve to speed the process of transmitting source selection documentation between the government and the bidders, and will save considerable costs in terms of producing and distributing documentation. It will also make more documentation accessible to

[15] Taliancich, Tony, EELV Program Review, OSAF/AQSL.

more interested parties.

D. In an extraordinary departure from tradition and in pursuit of the goal of stating objectives, not solutions, the program office prepared a one page "List of Objectives" in place of a statement of work for the RFP. This will evolve into a System Performance Document when combined with requirements from the Operational Requirements Document (ORD), but it will remain a top-level description of what the government wants this system to do rather than the voluminous system specifications prepared by the government in the past.

E. There are *no* MIL-STD compliance documents in this acquisition.

F. The Contractor is responsible for configuration control of the B- and C-level specifications using his own configuration management system.

G. The program office is limited to 50 personnel, including administrative personnel, Federally Funded Research and Development Contractors (FFRDC: Aerospace Corporation) and contractors. This figure compares with 400-500 in the Titan IV Program Office which was more the norm in the past.

Looking at EELV in the context of the Industry Advisory Council's nine key points for improved acquisitions, we find the following:

1. "Best Value" Contracting

The Integrated Product Team concept permeates this program from the DAE Review process to the Air Force Space Command liaison who resides in the program office. IPT's are a part of the fundamental program office organizational structure to include team members from the four contractors who are participating in the first phase of the program.

2. Team Development

Teaming arrangements are aided in this program by the fact that without a rigorous MIL-STD compliance regime, there can be more freedom

in the selection of subcontract team members. As a testimony to this ease of membership, two of the bidders plan to include support from former Soviet states on their teams.

3. Price, Not Cost, Basis, and
4. Fixed Price Contracting

The goal in streamlined acquisition is to award fixed price contracts where the government pays a fair price for a quality product and doesn't have to expend inordinate oversight resources in tracking the specifics of the contractor's cost data. The first phase of the EELV Program, Low-Cost Concept Validation (LCCV), awarded four Firm-Fixed-Price (FFP) contracts. At this time, due to the scope and nature of the Pre-EMD and EMD contracts, the program office expects to award Cost Plus contracts for these phases. One could certainly argue for using a fixed price contract structure for the second, pre-EMD phase of the contract as well since the technical risk at that time should still be minimal. For EMD, there is still sufficient concern over the ability to completely reinvent the launch structure for the nation within the programmed cost estimates that it is prudent to pursue a cost reimbursement contract for this phase. The use of cost-type contracts will necessitate more government visibility into contractor costing, but the scope of reporting will be reduced to minimize the impact on the contractors.

5. High Level Performance Requirements

As described earlier, the EELV program office gets superlative marks in this area. A one or two page statement of what is needed meets the letter and intent of this commercial practice. During the Low Cost Concept Validation and pre-EMD phases of the program, this one-page will be fleshed out into a System Performance Document of less than fifty pages. This refinement is performed under the guidance/direction of the user, Air Force Space Command.

6. Contractor Process, Procedures, and Formats.

As was mentioned previously, there are no MIL-STD requirements imposed in this contract. All quality assurance programs will be those of the selected contractors. The contractors are responsible for all configuration management (using their own systems), and they will develop authenticatable A, B, and C-level specifications in tailored formats for delivery sequentially at the three milestone review points.

7. Minimum Documentation and Reporting

Deliverable documentation for the EELV program is limited to the essentials as described in the IAC recommendations. These include:

a. The A, B, and C-level specifications described above
b. Interface Control Documents
c. Life Cycle Cost Estimates
d. System Design Description
e. Environmental Assessment
f. Operations and Support Documentation
g. System Trade Analyses
h. Risk Mitigation Demonstration Results

While this represents a significant amount of technical documentation, it is a vast reduction compared to similar programs in the past.

8. Government oversight of this program will, by necessity, be greatly reduced from previous programs simply because the program office limit of 50 personnel will not be able to keep pace with the traditional level of monitoring. In addition, significant relief has been granted from the traditional MIL-STD-1521 procedures for government reviews. The System Requirements Review and Preliminary Design Review will be tailored by the contractors and the government, and a third review in the LCCV Phase is left to the discretion of the

contractor. Government involvement at these reviews has been mutually agreed to be "limited". The reduction in government oversight also extends to the customer, where Air Force Space Command has implemented an Advanced Spacelift Requirements Office to provide a single voice to the System Program Office.

9. Voluntary Social Engineering

We are not yet at a point when much license can be taken with government "social engineering" programs. These are generally dictated by public law, and if Coopers & Lybrand/TASC are correct, one tenth of one percent of a government contract does not seem to be too much to invest in some small degree of greater social justice.

VI. SPACE BASED INFRARED SYSTEM (SBIRS)

The Space Based Infrared System will perform the infrared missions of missile warning, missile defense, technical intelligence, and battlespace characterization. The baseline architecture for SBIRS consists of a consolidated ground segment and satellites operating in geosynchronous, highly elliptical, and low earth orbits. These satellites will provide global coverage to detect, identify, track, and hand off radar cueing information for theater and strategic ballistic missile launches. They also detect and report other space and terrestrial infrared events.[16]

In a memorandum dated 4 November 1994, Dr. Kaminski, USD (A&T) designated SBIRS to be the pilot program for acquisition streamlining of space programs in DoD. As part of the pilot program, he directed that standard acquisition documentation requirements and oversight review be tailored or eliminated.[17]

[16] Warp, Gregory A., Acquisition Streamlining Lessons Learned, p.6.
[17] Ibid., p.7.

The SBIRS program had extraordinary success in its assaults on traditional program startup activities. Streamlining activities focused on:

A. Simplified Documentation.

In lieu of the normal 1000 pages of multiple documents, a single 36-page Single Acquisition Management Plan (SAMP) was developed to cover all statutory requirements and other information of use to the program manager.

B. Simplified Review Process.

Immediate savings were accomplished by the streamlined DAE Program Review process that transformed a year-long effort into 70 days. In addition, instead of multiple meetings stretched over a six-month period, the SBIRS defense reviews were reduced to three meetings -- a joint Air Force/DoD briefing on program status and issues; a pre-brief to the DAE; and the DAE program review for final approval of the acquisition strategy. All the meetings took place within a two-week period.

C. Compliance Documentation.

There are approximately 65 MIL-STD and MIL-SPEC compliance documents in the existing Defense Support Program. Increased emphasis on acquisition streamlining eliminated nearly all of the compliance documentation for SBIRS. The new program currently has only two MIL-STD compliance documents on the contract. The majority of the reports from the contractors will be in their formats.

D. Program Oversight.

The SBIRS program attributes much of its success to active involvement from senior Air Force and DoD officials. This model will be continued through the development period. DoD staff will be continuously involved through the Overarching IPT process and senior DoD and Air Force

officials will receive periodic reviews as a "CEO Board".

E. Performance Based Contracting

SBIRS made a major transition from earlier programs by moving from overspecifying all activities to defining all requirements in terms of system performance. Contractors' proposals were evaluated against objective standards.

F. Integrated Product Teams.

Use of IPTs was mandated by the USD (A&T) and proved to be extremely successful during the program approval phase of SBIRS. During the pre-EMD phase, the IPTs will conduct military utility versus cost trade studies of specific tactical parameters and make recommendations for Joint Requirements Oversight Council (JROC) approval by June 1996.[18]

While EELV and SBIRS are examples of the most forward-leaning programs on the frontiers of new DoD acquisition paradigms (and there are many others), Global Broadcast Service (GBS) provides us a vivid example of where the next challenges lie.

VII. GLOBAL BROADCAST SATELLITE SYSTEM (GLOBAL BROADCAST SERVICE)

The Global Broadcast Service is a program which is ideally suited for commercial acquisition practices. The objective of GBS is to provide a satellite broadcast capability to send a tremendous volume (hundreds of Megabits per second (Mbps)) of data to forces deployed anywhere in the world. This system will be used to send imagery, communications, maps, weather, situational awareness information, and virtually any information the warrior could think to ask for. The remarkable thing about this system is that it already exists, to a great extent,

[18] Fisher, James, Point Paper on SBIRS Acquisition Reform, 12 March 1996.

in the commercial DirecTV system. Hughes built the first satellites, which are already on orbit. Others have followed or will follow soon. The user equipment consists of an 18 inch antenna and a receiver which sell for approximately $700 on the commercial market, and there will be more than a million sold. The most difficult part of the system, technically, will be the network control and scheduling for the transmissions. This will be a daunting task, but there are commercial companies who have solved similar problems for satellite television broadcast network management. Encryption will also be a technical challenge. The current plan is to field the program in three phases. First, transponders will be leased from commercial satellites in the near term. The second phase will include GBS payloads on Navy UHF Follow-On satellites in the late 1990s. Finally, it is currently anticipated that dedicated satellites will be launched early next century for the GBS mission.[19]

There have been government program office personnel analyzing and preparing for this program for over two years. A Mission Needs Statement was approved by the Joint Requirements Oversight Council (JROC) in August 1995. The organizational arrangements as to who would be in charge of what parts of the program were decided in August. . .and again in October. . .and again in December. . .and there still seems to be some hesitation on the parts of some of the players. For the record, Dr. Kaminski named the Air Force as the Executive Agent for GBS. The Defense Informations Systems Agency (DISA) will play a prominent role for information management. The National Security Agency will be responsible for encryption implementation, and the Army will lead user equipment development from a central program office at Ft. Monmouth. ARPA will also have a role in the development of the information management portion of the system.[20]

[19] Scott, William B., "Global Broadcast Potential Explored", AW&ST, February 5, 1996, pp.61-62.
[20] Baciocco, David A., Direct Broadcast Satellites Offer Added Support to Tactical Users, SIGNAL, August 1995, p.30.

The problem with GBS is not its ability to capitalize on the benefits of streamlined acquisition; it is that it has taken literally years to get the program started because of political competition in the Pentagon. GBS certainly didn't invent this sport, it is just the most recent space program to go through it. Last year it was SBIRS. With a steadily declining number of new starts now and in the future, the competition has become much more heated in recent years. Bureaucracies need to have programs to sustain themselves, and with all the government reductions, competition is fierce. Furthermore, there is sufficient overlap and ambiguity in the roles of the various services and agencies to ensure a lively struggle in nearly every new space program for the foreseeable future. All these organizations recognize that space systems will continue to be critical assets in the future, and are potentially the ticket for survival for agencies fortunate enough to be given program responsibility.

There are those who would argue that one of the greatest strengths of democracy, and bureaucracy, is that the political system moves very slowly and forces great deliberations to be thoroughly discussed before a decision is made. It is simply difficult to reconcile this process with direction from the Secretary of Defense to move quickly.

VIII. ACQUISITION INNOVATION IN OTHER SPACE SYSTEMS

Without exploring any other space programs in great depth, I will finish on a more positive note by highlighting some success stories in DoD space systems acquisition innovation.

1. The Navy pioneered one aspect of commercial practices several years ago in their UHF Follow-On (UFO) communications satellite program. Hughes was contracted to provide a turnkey satellite communications capability on orbit. There was very little customer oversight in the development of this

system, and notwithstanding some setbacks early in the program, it has been very successful. The acquisition model of relying on contractors to be responsible for all aspects of a program up to the point of turnover to the government for operations has a great deal of merit and is being considered as one candidate approach by the acquisition reform community.[21]

2. The Global Positioning System has a stellar record of acquisition success during its twenty year history. One of the more notable achievements was the approval of multi-year funding for the procurement of the initial twenty-four satellite buy for the operational constellation. In this "special case", Congress saw the "dollars and sense" savings associated with the long term production of an unusually large number of identical spacecraft and approved the multi-year commitment.

3. For over thirty years, the Air Force and the National Oceanographic and Atmospheric Agency (or its predecessors) have been developing weather satellites in parallel, with greater or lesser degrees of coordination. In the last few years, the two programs have been converged, or consolidated, under NOAA leadership, to build the next generation meteorological satellite, the National Polar Orbiting Operational Environmental Satellite System (NPOESS). The program will be jointly staffed by Air Force and NOAA personnel and is an excellent example of the Administration's active pursuit of dual-use technologies.[22]

4. In his testimony before the National Security Subcommittee of the House Appropriations Committee, Dr. Kaminski described an initiative called the Commercial Satellite Communications Initiative. In this program, the DoD leases transponders on commercial satellites to augment the MILSATCOM architecture. This is a new approach in that the government is leasing the entire

[21] Kaminski, Paul G., Statement before the NSS of the HAC on the FY 96 DoD Space Budget, p. 9.
[22] Ibid., p.5.

transponder, not just channel capacity. This additional capacity will be integrated with the network traffic for the remainder of the military satellite communications network, and will provide critical overflow capacity.[23] The Navy has conducted several successful demonstrations of this capability proving that commercial and DoD communications can provide hot back-up and switchover capabilities to each other.[24] The technical success of this approach could enable the implementation of a Civil Reserve Space Fleet analagous to the Civil Reserve Air Fleet which proved invaluable during Desert Shield/Desert Storm operations. In such a program, the government could provide certain subsidies to commercial communications satellite developers in exchange for the ability to call on these satellites in times of national crisis.

5. While EELV and SBIRS represent pathfinder programs which are implementing acquisition reform from program inception, one might ask the question "What are the implications for programs which are already underway, and which did not have minimal CDRL deliveries and MIL-STD compliance requirements?" DoD space programs such as Milstar have taken the initiative to review existing contractual requirements and apply streamlining provisions where they make sense to reduce contract deliverable documentation and rely on contractor quality programs, for example. Although there are, understandably, some sunk costs associated with the more traditional delivery requirements, significant savings will still be realized in the programs. Reduced program office staffing is a reality for all programs whether new or ongoing.

IX. SUMMARY AND CONCLUSIONS

This report has reviewed both quantitative and qualitative analyses showing that there are significant savings in both time and money to be realized

[23] Ibid., p.9.
[24] Robinson, Clarence A., "Navy Commercial Satellite Use Spreads Sea-Based Multimedia", SIGNAL, December 1994, pp.45-46.

by rethinking the way the government buys space systems. The Department of Defense can be justifiably proud of the progress it has made in the area of acquisition reform.

Amidst sporadic potshots from Congress, the DoD has seized the initiative and implemented wide-ranging reforms which did not require changes in the law to bring about dramatic improvements in defense systems acquisition. Leadership from the Secretary of Defense and service secretaries all the way down to the action officers in many system program offices have cast off outmoded management practices and we have hard evidence in several current programs of the savings in time and dollars which can be achieved early in an acquisition program. The EELV and SBIRS programs merit our continued scrutiny as they progress through development and operational deployment to determine just how successful these new approaches can be. The real proof will come when we turn on the switch or press the launch button to see the systems work, and then return to the cost and schedule spreadsheets to see if the savings were real. While there is still much to be done, particularly in the area of getting to the starting line for a program, I believe we are on the road to a revolution in space systems acquisition management.

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